

Name: \_\_\_\_\_

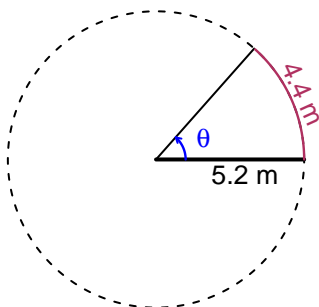
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## Trig Final (SLTN v698)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 4.4 meters. The radius is 5.2 meters. What is the angle measure in radians?

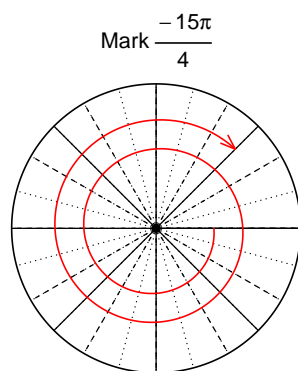


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$$\theta = 0.8462 \text{ radians.}$$

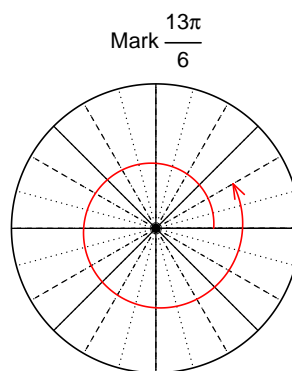
### Question 2

Consider angles  $-\frac{15\pi}{4}$  and  $\frac{13\pi}{6}$ . For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for  $\sin\left(-\frac{15\pi}{4}\right)$  and  $\cos\left(\frac{13\pi}{6}\right)$  by using a unit circle (provided separately).



Find  $\sin(-15\pi/4)$

$$\sin(-15\pi/4) = \frac{\sqrt{2}}{2}$$



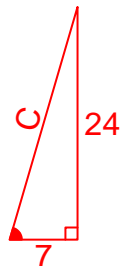
Find  $\cos(13\pi/6)$

$$\cos(13\pi/6) = \frac{\sqrt{3}}{2}$$

### Question 3

If  $\tan(\theta) = \frac{24}{7}$ , and  $\theta$  is in quadrant III, determine an exact value for  $\sin(\theta)$ .

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



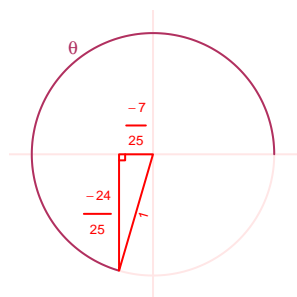
Solve the Pythagorean Equation

$$7^2 + 24^2 = C^2$$

$$C = \sqrt{7^2 + 24^2}$$

$$C = 25$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\sin(\theta) = \frac{-24}{25}$$

### Question 4

A mass-spring system oscillates vertically with an amplitude of 7.72 meters, a midline at  $y = 2.79$  meters, and a frequency of 4.38 Hz. At  $t = 0$ , the mass is at the midline and moving down. Write an equation to model the height ( $y$  in meters) as a function of time ( $t$  in seconds).

Any of these equations would get full credit.

$$y = -7.72 \sin(2\pi 4.38t) + 2.79$$

or

$$y = -7.72 \sin(8.76\pi t) + 2.79$$

or

$$y = -7.72 \sin(27.52t) + 2.79$$